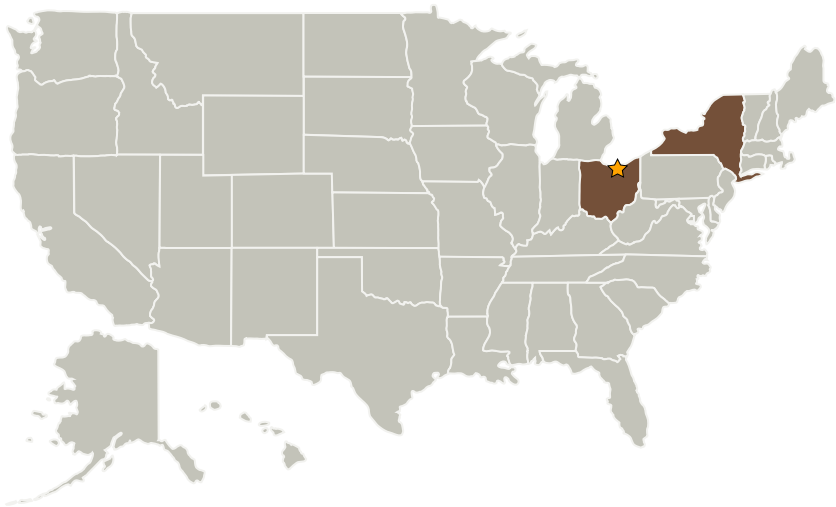
# Digital System e-Prognostics for Critical Aircraft Computer Systems, Phase I

Completed Technology Project (2008 - 2008)

## Project Introduction

Impact Technologies, in cooperation with Raytheon, proposes to develop and demonstrate an innovative prognostics approach for aircraft digital electronics. The proposed non-invasive prognostic approach consists of advanced software and a minimal sensing, focused on incipient fault detection, isolating failure modes and predicting remaining useful life using improved prognostic models. The innovations will include development and validation of physics of failure models, applicable to a broad range of CMOS digital systems; associated damage accumulation models; and a signal processing and feature extraction approach for detecting and isolating VLSI failure modes. In this approach, cradle-to-grave health state awareness is achieved through the use of model-based assessments in the absence of fault indications, and by updating these model-based assessments with sensed information. The PowerPC MPC7447 microprocessor will be used for validation testing during this program based on its use in such systems as the F-35 fighter Integrated Core Processor (ICP) and the fact that it is representative of the wide spread CMOS technology found in modern digital devices. Finally, a commercialization path beginning with testing of the technologies within Raytheon's Labs will be presented along with the team's vision of how e-Prognostic technologies can be transitioned into safety critical commercial and military digital.

## Primary U.S. Work Locations and Key Partners

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## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Glenn Research Center (GRC)

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

**Small Business Innovation Research/Small Business Tech Transfer**

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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| ★Glenn Research Center(GRC) | Lead Organization | NASA Center | Cleveland, Ohio |
| Impact Technologies, LLC | Supporting Organization | Industry | Rochester, New York |

| Primary U.S. Work Locations | |
|---|---|
| New York | Ohio |

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

## Technology Areas

**Primary:**

- TX10 Autonomous Systems
  - TX10.2 Reasoning and Acting
    - TX10.2.5 Fault Diagnosis and Prognosis